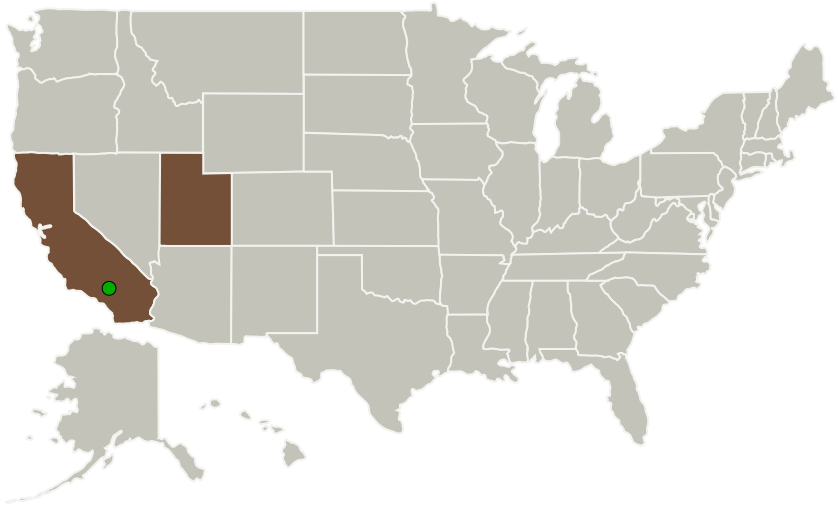
Tunable Laser for High-Performance, Low-Cost Distributed Sensing Platform, Phase I

Completed Technology Project (2017 - 2017)

Project Introduction

The proposed effort will establish technical feasibility of an approach to optimizing a low-cost, fast-sweeping tunable laser for distributed sensing. Multiple approaches for performance optimization will be reviewed, modeled, and simulated. Subsystem prototypes will also be fabricated and analyzed to understand subsystem hardware manufacturing and performance limitations. This Phase I effort will result in selection of an appropriate laser performance optimization approach and will yield estimates of performance, size, weight, power, and cost improvements expected from a Phase II prototype. The resultant optimized tunable laser module would enable a distributed fiber-optic sensing platform with dramatically-improved performance and significant simultaneous improvement in platform size, weight, power, and cost compared to current commercial offerings. The technology will considerably improve NASA's flight test measurement and in-situ monitoring capability over the current state of the art, opening up new distributed sensing possibilities for real-time, in-situ airframe/spaceframe measurements. In addition to supporting distributed static strain and temperature measurements, the technology allows for distributed fiber-optic acoustic/vibration sensing allowing for distributed modal analysis, non-destructive evaluation, and identification/characterization of transient events. With an improved understanding of distributed airframe/spaceframe structural dynamics, the technology will lead to improved airframe and component designs. With improved, integrated real-time feedback control signal generation and structural health monitoring, future aircraft and space-flight vehicles will operate more safely, predictably, and efficiently.

Primary U.S. Work Locations and Key Partners



Tunable Laser for High-Performance, Low-Cost Distributed Sensing Platform, Phase I Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Sequent Logic LLC	Lead Organization	Industry Small Disadvantaged Business (SDB)	North Logan, Utah
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations	
California	Utah

Images

Briefing Chart Image
Tunable Laser for High-Performance, Low-Cost Distributed Sensing Platform, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/126348)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Sequent Logic LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

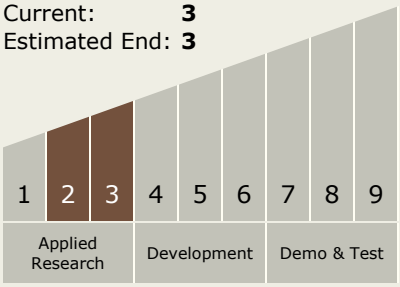
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Ryan Seeley

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors